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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
SRIDHAR GOLLAMUDI

Serial No.: 09/873,706

Filed: JUNE 4, 2001

For: METHOD FOR MULTIPLE ANTENNA TRANSMISSION

Examiner: J. PERILLA

Group Art Unit: 2634

Att'y Docket: 2100.013200

Customer No. 46290

APPEAL BRIEF

CERTIFICATE OF MAILING
37 C.F.R. 1.8

I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date below:

08/02/05 Kathy Danas
Date Signature

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Appellant hereby submits this Appeal Brief to the Board of Patent Appeals and Interferences in response to the final Office Action dated March 16, 2005. A Notice of Appeal was filed on June 14, 2005 and so this Appeal Brief is believed to be timely filed.

The fee for filing this Appeal Brief is $500, and is attached hereto.

Should such request or fee be deficient or absent, consider this paragraph such a request and authorization to withdraw the appropriate fee from Williams, Morgan & Amerson's Deposit Account 50-0786/2100.013200.

I. REAL PARTY IN INTEREST

The present application is owned by Lucent Technologies, Inc. The assignment of the present application to Lucent Technologies, Inc., is recorded at Reel 11901, Frame 0360.

II. RELATED APPEALS AND INTERFERENCES

Appellant is not aware of any related appeals and/or interferences that might affect the outcome of this proceeding.

III. STATUS OF THE CLAIMS

Claims 1-13 are pending in the present application. Claims that are the subject of the present Appeal Brief – claims 1-13 – are set forth in the attached "Claims Appendix." Claims 1-2 and 5-13 stand finally rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Harrison (U.S. Patent No. 6,154,485). Claims 3-4 stand finally rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Harrison in view of Forssen, et al (U.S. Patent No. 6,173,014).

IV. STATUS OF AMENDMENTS

There were no amendments after the final rejections.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Claim 1 sets forth a method of transmitting signals from at least two antennae. The claimed method includes determining at least one correlation coefficient between received signals from the at least two antennae and, in response to the at least one determined correlation

coefficient, selecting at least one of orthogonal coding and beamforming for transmitting signals using the at least two antennae. Figure 1 depicts one exemplary embodiment of a system 8 that may implement the claimed method. The system 8 includes two transmit antennae 24, 26. A space-time encoder 12 may be used to compute correlation coefficients that can be used to control relative amounts of beamforming and orthogonal coding. See Patent Application, page 6, line 18 – page 12, line 14 and Figures 1-2.

Appellants note that a correlation coefficient is a numeric measure of the strength of a linear relationship between two random variables. A correlation ρ_{xy} between two random variables X and Y with expected values μ_X and μ_Y and standard deviations σ_X and σ_Y may be defined as:

$$\rho_{xy} = \frac{\mathrm{cov}(X,Y)}{\sigma_X \sigma_Y} = \frac{E((X-\mu_X)(Y-\mu_Y))}{\sigma_X \sigma_Y}.$$

For example, the Pearson product-moment correlation coefficient can be used to estimate the correlation of X and Y using a series of n measurements of X and Y, which may be written as x_i and y_i where $i = 1, 2, ..., n$. The Pearson correlation coefficient may be written:

$$r_{xy} = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{(n-1) s_x s_y}$$

where $\bar{x}$ and $\bar{y}$ are the sample means of x_i and y_i, s_x and s_y are the sample standard deviations of x_i and y_i and the sum is from $i = 1$ to n.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Appellant respectfully requests that the Board review and overturn the two rejections present in this case. The following issues are presented on appeal in this case:

(A) Whether claims 1, 2, and 5-13 are anticipated by Harrison; and

(B) Whether claims 3-4 are obvious over Harrison in view of Forssen.

VII. ARGUMENT

A. Legal Standards

An anticipating reference by definition must disclose every limitation of the rejected claim in the same relationship to one another as set forth in the claim. *In re Bond*, 15 U.S.P.Q.2d 1566, 1567 (Fed. Cir. 1990).

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (CCPA 1974). Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. That is, there must be something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561 (Fed. Cir. 1986). In fact, the absence of a suggestion to combine is dispositive in an obviousness determination. *Gambro Lundia AB v. Baxter Healthcare Corp.*, 110 F.3d 1573 (Fed. Cir. 1997). The mere fact that the prior art can be combined or modified does not make the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990); M.P.E.P. § 2143.01. Third, there must be a reasonable expectation of success.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991); M.P.E.P. § 2142.

A recent Federal Circuit case emphasizes that, in an obviousness situation, the prior art must disclose each and every element of the claimed invention, and that any motivation to combine or modify the prior art must be based upon a suggestion in the prior art. *In re Lee*, 61 U.S.P.Q.2d 143 (Fed. Cir. 2002). Conclusory statements regarding common knowledge and common sense are insufficient to support a finding of obviousness. *Id.* at 1434-35.

B. <u>Claims 1-2 and 5-13 Are Not Anticipated by Harrison</u>

Harrison is concerned with receiving signals using combined orthogonal transmit diversity and adaptive array techniques. Harrison describes a coefficient α that may be used to calculate adaptive array filter weights 90 and 92, which may be used by an adaptive array processor 76 to allow a base transmitter to smoothly transition between an orthogonal transmit diversity mode and an adaptive array mode. This smooth transition may allow the base transmitter to smoothly disable the adaptive array mode in proportion to the degradation of the quality of feedback data from a receiver. See Harrison, col. 8, ll. 23-35.

In the FINAL Office Action, the Examiner alleges that the adaptive array filter weights 90 and 92 are correlation coefficients. Appellants respectfully disagree. The adaptive array filter weights 90 and 92 described in Harrison are computed from the coefficient α, which may be selected arbitrarily. For example, when the value of the coefficient α is equal to zero, the adaptive array weights 90 and 92 are set equal to 1 so that the transmitter operates in an orthogonal transmit diversity mode. If the coefficient α is set to the reciprocal of the square root of 2, the base transmitter operates in an adaptive radio mode, and if the coefficient α is set to a value between zero and the reciprocal of the square root of 2, the base transmitter operates in a mixed mode. See Harrison, col. 8, ll. 4-35.

However, neither the adaptive array weights nor the coefficient α described by Harrison is a correlation coefficient. As discussed above, a correlation coefficient is a well-known statistical quantity that represents the degree to which distributions of two or more quantities are linearly associated. For example, a correlation coefficient, such as the Pearson product-moment correlation coefficient, may indicate the quality of a least squares fit to a data sample. Thus, Appellants respectfully submit that Harrison does not describe or suggest determining at least one correlation coefficient between received signals from at least two antennae, as set forth in independent claim 1.

For at least this reason, Appellants submit that claim 1 and all claims depending therefrom are not anticipated by Harrison and request that the Examiner's rejections of claims 1-2 and 5-13 under 35 U.S.C. 102(e) be REVERSED.

C. Claims 3-4 Are Not Obvious over Harrison in view of Forssen

As discussed above, Harrison fails to teach or suggest determining at least one correlation coefficient between received signals from at least two antennae, as set forth in independent claim 1. The Examiner also admits that Harrison also fails to teach or suggest determining at least one phase correlation coefficient, and so the Examiner relies upon Forssen to teach the use of amplitude and phase information to create a beam. However, Forssen fails to remedy the fundamental deficiencies of Harrison discussed above with respect to claim 1. Thus, the prior art of record fails to teach or suggest the limitations set forth in claim 1 and all claims depending therefrom. Furthermore, the cited references are both completely silent with regard to correlation coefficients and therefore fail to provide any suggestion or motivation to modify the prior art to arrive at Applicants' claimed invention.

For at least the aforementioned reasons, Appellant respectfully submits that the present invention is not obvious over Harrison or Forssen, either alone or in combination. Appellant respectfully requests that the Examiner's rejections of claims 3-4 under 35 U.S.C. 103(a) be REVERSED.

VIII. CLAIMS APPENDIX

The claims that are the subject of the present appeal – claims 1-13 – are set forth in the attached "Claims Appendix."

IX. EVIDENCE APPENDIX

There is no separate Evidence Appendix for this appeal.

X. RELATED PROCEEDINGS APPENDIX

There is no Related Proceedings Appendix for this appeal.

XI. CONCLUSION

In view of the foregoing, it is respectfully submitted that the Examiner erred in not allowing all claims pending in the present application, claims 1-13, over the prior art of record. The undersigned may be contacted at (713) 934-4052 with respect to any questions, comments or suggestions relating to this appeal.

Respectfully submitted,

Date: 8/2/05

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AGENT FOR APPLICANTS

CLAIMS APPENDIX

1. (Previously Presented) A method of transmitting signals from at least two antennae comprising the steps of:

determining at least one correlation coefficient between received signals from the at least two antennae; and

in response to the at least one determined correlation coefficient, selecting at least one of orthogonal coding and beamforming for transmitting signals using the at least two antennae.

2. (Previously Presented) The method of claim 1, wherein the step of determining at least one correlation coefficient between the received signals comprises determining at least one amplitude correlation coefficient.

3. (Previously Presented) The method of claim 1, wherein the step of determining at least one correlation coefficient between the received signals comprises determining at least one phase correlation coefficient.

4. (Previously Presented) The method of claim 3, wherein the at least one phase correlation coefficient is estimated.

5. (Previously Presented) The method of claim 1, wherein the step of determining at least one correlation coefficient comprises determining at least one correlation between the received signals.

6. (Previously Presented) The method of claim 1, wherein the step of selecting at least one of orthogonal coding and beamforming comprises selecting a proportion of orthogonal coding relative to a proportion of beamforming used for transmitting the signals.

7. (Previously Presented) The method of claim 6, wherein the at least one correlation coefficient varies between a first level and a second level.

8. (Previously Presented) The method of claim 13, wherein the at least one correlation coefficient having a level between the first and second levels results in selecting both beamforming and orthogonal coding for transmitting.

9. (Previously Presented) The method of claim 13, wherein the at least one correlation coefficient determines the proportion of beamforming relative to orthogonal coding used for transmitting.

10. (Previously Presented) The method of claim 9, wherein the at least one correlation being at a level that is closer to the first level results in transmitting more beamforming than orthogonal coding.

11. (Previously Presented) The method of claim 9, wherein the at least one correlation coefficient being at a level that is closer to the second level results in transmitting using more orthogonal than beamforming.

12. (Previously Presented) The method of claim 9, wherein the at least one correlation coefficient relative to the first and second reference levels determines the relative amounts of beamforming relative to orthogonal coding used for transmitting.

13. (Previously Presented) The method of claim 7, wherein the at least one correlation coefficient being substantially equal to the first level results in selecting beamforming for transmitting and wherein the at least one correlation coefficient being substantially equal to the second level results in selecting orthogonal coding for transmitting.